

REMARKS

Claims 1-24 and 27-36 are all the claims pending in the application after canceling claims 25-26 and entering new claims 35-36.

Reconsideration and review on the merits are respectfully requested.

Formal Matters

Applicants appreciate that, on the Office Action Summary sheet, the Examiner has acknowledged Applicants' claim for foreign priority and receipt of a certified copy of the priority document in this National Stage application from the International Bureau.

Applicants appreciate that the Examiner has also returned two initialed and signed copies of Forms PTO/SB/08 A & B (modified) submitted to the Patent Office on April 9, 2002, and November 27, 2002, respectively.

Election/Restrictions

Applicants affirm the election of Group I, claims 1-7, 25 and 26, drawn to a porous film, without traverse.

Claims from Group II, claims 8-24 and 32, drawn to a process of making a porous film, and Group III, claims 27-31, 33 and 34, drawn to a laminate, are withdrawn from further consideration by the Examiner as being drawn to nonelected inventions. With respect to claims 8-24 and 32, Applicants request rejoinder of these process claims pursuant to MPEP §821.04 when the product claims are allowed.

Claim Rejections - 35 USC § 103

Claims 1-3, 25 and 26 are rejected under 35 U.S.C. 102(b) as allegedly anticipated by or, in the alternative, under 35 U.S.C. 103(a) as allegedly obvious over Tamura et al (US 4,539,393) for the reasons given in the Office Action.

The Examiner asserts that Tamura uses the same materials and the same process to make a porous polymetaphenylene isophthalamide film as Applicants, i.e. casting a dope prepared by dissolving a polymetaphenylene isophthalamide in an N-methyl-2-pyrrolidone solvent and coagulating it in a bath comprising N-methyl-2-pyrrolidone solvent and water. The Examiner believes that after coagulating, the film is stretched to form the pores. The Examiner further states that Tamura discloses the moisture absorption deformation from complete drying of the porous film as an alternative measurement of the gas permeability as described in the present claims. The Examiner states that the porous film of Tamura has a Young's modulus within the range set out in the present claims. It is the Examiner's position that, since the porous film of the present invention is produced from the same materials and the same process disclosed by Tamura, the gas permeability, porosity and cross-sectional pore laminar coefficient would be inherently present. It is the examiner's position that Tamura anticipates or strongly suggests the claimed subject matter.

With regard to claims 25 and 26, The Examiner recognizes that Tamura is silent as to the use of the porous film as a battery separator. However, the Examiner does not give the recitation "a battery separator" any patentable weight based on the Examiner's position that a preamble is denied the effect of a limitation where the claim is drawn to a structure and the portion of the

claim following the preamble is a self-contained description of the structure not depending for completeness upon the introductory clause.

Claim 4 is rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Tamura et al for the reasons given in the Office Action.

The Examiner states that Tamura discloses a porous film being self-supporting. The Examiner recognizes that Tamura is silent as to a film thickness. However, the Examiner asserts that such a variable would have been recognized by one skilled in the art to obtain the desired transparency and moisture absorption dimensional stability of the film, and the Examiner concludes that, in the absence of unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the porous film having a thickness instantly claimed since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

Claims 5-7 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Tamura et al in view of Tsutsumi et al (US 5,571,875) for the reasons given in the Office Action.

With regard to independent claim 5, the Examiner recognizes that Tamura is silent as to an inorganic whisker as a filler. However, the Examiner asserts that Tsutsumi teaches an inorganic whisker used as a filler in the matrix of the aromatic polyamide resin composition, which is alleged to be obvious to employ in the porous film motivated by the desire to improve mechanical properties and dimensional stability of the porous film.

With regard to claim 6, the Examiner states that Tsutsumi teaches the weight ratio of the polymetaphenylene isophthalamide to the whisker being 1:2 to 20:1. However, the Examiner asserts that such a variable would have been recognized by one skilled in the art to impart the mechanical strength and dimensional stability of the film as well as to obtain an ease of processibility of the film. As such, in the absence of unexpected results, the Examiner states that it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the whisker having an amount instantly claimed since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

With regard to claim 7, the Examiner states that Tsutsumi teaches the whisker having a fiber length L from 5 to 50 microns and a fiber diameter D from 0.05 to 1 microns where the L/D ratio assertedly meets the specific ratio required by the claims. The Examiner states that such a dimension would have been recognized by one skilled in the art to impart the mechanical strength and dimensional stability of the film as well as to obtain an ease of processibility of the film. As such, in the absence of unexpected results, the Examiner states that it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the whisker having an amount instantly claimed since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

Applicants respectfully traverse the rejections for the following reasons.

Independent claims 1-3 and 5 are clearly distinguished from the cited art.

Applicants respectfully submit that although Tamura et al discloses a polymetaphenylene isophthalamide film, the reference merely teaches a film having a porous structure which is undeveloped. Therefore, Tamura et al neither teaches nor suggests the porous film as claimed in claims 1 and 3 having a permeability of 0.2 - 1000 ml/sec, the porous film of claim 2 having a porosity of 60 - 80% or the porous film of claim 5 containing inorganic whiskers and having a porosity of 10 to 80%. In other words, since Tamura et al describes a polymetaphenylene isophthalamide film having refractive indices in the three axes for D-line of a wavelength of 589 nm satisfying a predetermined relationship which is defined by the formula relating to the three axes refractive indices in the film as set forth in Tamura's claim 1 (see Tamura's claim 1, the description in the Summary of the Invention, the description regarding formula (III) in columns 9 and 10, etc.), the film is transparent and, thus, Tamura et al is considered to relate to a film of an undeveloped porous structure as compared with the porous film of the invention.

The Examiner states that the porous film of the present invention is produced by the same process disclosed in Tamura et al, but Applicants respectfully submit that this is based on the Examiner's misunderstanding. In Tamura et al, the process of dope coagulation → drying → stretching → heat treatment is carried out and the film is made porous during the stretching step (see, the Office Action, page 3, bottom line). On the contrary, in the present invention, the process of dope coagulation → drying → stretching → heat treatment is carried out and the film is made porous during the coagulation step (see, the present specification, for examples, page 10, lines 25 - 28; page 10, line 37 through page 11, line 9; and page 11, lines 14 - 15, etc.). The processes are different from each other in the step for forming the high dimensional porous

structure. The pores are formed through the structural destruction (defect formation) by an external force of stretching in Tamura et al, while in the present invention, the pores are formed through the phase separation during the coagulation step. Therefore, the porous film obtained by the process of Tamura et al is considered to have inferior homogeneity and voids. On the other hand, according to the process of the present invention, the film has a porous structure prior to stretching and the pores are enlarged by stretching, which process is not a technique for producing a defective structure.

Further, Tamura et al describes that a film of excellent transparency is obtained by adding an inorganic salt to the coagulating bath (see, column 7, line 56 through column 8, line 2, and column 12, line 65 through column 13, line 10) and that the obtained film is uniform and transparent (see, page 8, lines 27 - 29, etc.). Therefore, Tamura et al merely teaches a film of an undeveloped porous structure different from the porous film of the present invention.

Furthermore, a person with ordinary skill in the art would easily understand that a film as described in Tamura et al, having a moisture absorption dimensional variation value as set forth in Tamura's Table 1, can never attain the excellent values of the gas permeability of 0.2 - 1000 ml/sec as defined in claims 1 and 3 and the porosity of 60 - 80% as defined in claim 2.

With respect to claim 5, by Tamura's process of stretching the film after coagulation as stated by the Examiner, there may be obtained merely a film of an undeveloped porous structure without having a high porosity of 60 - 80% as in the presently claimed invention. Therefore, the film of claim 5 should clearly be distinguished from the film of Tamura et al even in view of the

film of Tsutsumi et al (US 5,571,975) consisting of polymetaphenylene isophthalamide and inorganic whisker.

With respect to claims 25-26, Applicants cancel these two claims and replace them with new claims 35 and 36. The Examiner acknowledges that Tamura is silent as to the use of the porous film as a battery separator, but the Examiner does not give the term “battery separator” in the preamble patentable weight. New claims 35-36 describe “battery separator” in the main portion of the claim after the preamble. Support can be found, for example, at page 2, lines 29-34 and page 5, lines 6-8, and in claim 25 of the specification as originally filed. Entry of the new claims is hereby requested along with reconsideration and withdrawal of the basis for the rejection of claims 25-26, now canceled and replaced with new claims 35-36.

Applicant note that the Examiner states that Tamura et al discloses a porous polymetaphenylene isophthalamide film having a Young’s modulus of 600 Km (table 1). However, the Young’s modulus described in Tamura et al is presented in terms of the unit of kg/mm^2 as clearly indicated in Table 1. On the contrary, in the present application, a Young’s modulus by Tamura’s unit of measurement is not defined, but a specific Young’s modulus is presented in terms of the unit Km. Therefore, if any rejection in view of Tamura is maintained, the Examiner is kindly requested to clarify the applicability of Tamura’s unit of measurement of kg/mm^2 to the present invention which uses a unit of measurement of Km.

Applicants Amend Multiple Dependent Claims

Applicants amend the multiple dependent claims as follows. Claims 11 – 13, 15 and 22 are amended to depend only on claim 8; and Claim 33 is amended to depend on Claims 27 - 30.

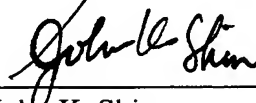
AMENDMENT UNDER 37 C.F.R. § 1.111
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Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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PATENT TRADEMARK OFFICE

Date: May 27, 2003

APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claims 25-26 are canceled.

The claims are amended as follows:

11. (Amended) A process according to [any one of claims] claim 8 [to 10], wherein the dope prepared by dissolving a polymetaphenylene isophthalamide-based polymer in an amide-based solvent contains no inorganic salts.

12. (Amended) A process according to [any one of claims] claim 8 [to 11], wherein after coagulation, the porous film is rinsed with water, dried and then stretched to a factor of 1.3-5 in the uniaxial direction or to a factor of 1.3-10 in the orthogonal biaxial directions on an area scale, at a temperature of 270-340°C.

13. (Amended) A process according to [any one of claims] claim 8 [to 11] wherein, after coagulation, the porous film is further stretched in a stretching bath comprising an amide-based solvent containing a non-solvent for the polymetaphenylene isophthalamide-based polymer.

15. (Amended) A process according to [any one of claims] claim 8 [to 11], wherein the coagulation is followed by immersion in a bath comprising an amide-based solvent containing a non-solvent for the polymetaphenylene isophthalamide-based polymer, with an amide-based solvent concentration of 50-80 wt% and a temperature of 50-98°C.

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22. (Amended) A process according to [any one of claims] claim 8 [to 21], wherein the dope used is one in which inorganic whiskers are dispersed and a polymetaphenylene isophthalamide-based polymer is dissolved in an amide-based solvent.

33. (Amended) A battery separator comprising a porous film according to any one of claims 27 to [31] 30.

Claims 35 and 36 are added as new claims.